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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,054	03/17/2005	Jun Konishi	Q72079	7044

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EXAMINER	
CHOI, LING SIU	
ART UNIT	PAPER NUMBER
1713	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/528,054	KONISHI ET AL.	
	Examiner	Art Unit	
	Ling-Siu Choi	1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) *11-19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-10* is/are rejected.

7)☐ Claim(s) *2* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/17/2005, 9/8/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claims 1-10, drawn to a process to produce a chlorinated polyolefin (claims 1-6) and a chlorinated polyolefin (claims 7-10).

Group II, claims 11-19, drawn to a chlorinated polyolefin crosslinkable composition (claims 11-15) and articles (claims 16-19).

2. The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: there is no common inventive feature among these two groups because the chlorinated polyolefins cited in Group I and II are different.

3. During a telephone conversation with Mr. Bruce E. Kramer on Dember 27, 2006, a provisional election was made without traverse to prosecute the invention of Group I, claims 1-10. Affirmation of this election must be made by applicant in replying to this

Office action. Claims 11-19 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Analysis

5. Summary of Claim 1:

A process to produce a chlorinated polyolefin comprising the steps of	
A	melt and kneading a polyolefin and then molding it to obtain a solid
B	pulverizing the solid into powder having a mean particle size of no greater than 500 μm
C	chlorinating the powder

Summary of Claim 2:

A process to produce a chlorinated polyolefin according to claim 1, wherein the chlorinating step further comprises	
first step	chlorination at above the crystal melting start temperature and more than 10°C below the crystal melting peak temperature of the polyolefin starting material as determined by DSC
second step	interrupting the chlorine supply and performing heat treatment by heating to a temperature which is higher than 5°C below the crystal melting peak temperature
third step	rechlorination at a temperature above the crystal melting start temperature of the chlorinated polyolefin after the heat treatment step

Claim Rejections - 35 USC § 103

6. **The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:**

> **(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.**

7. Claims 1, 3, 7-8, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al. (US 4,767,823) in view of Yasugata (JP 05-009332).

Jones et al. disclose a process to chlorinate polyethylene having a weight-based median particle size of from about 120 to about 600 microns, wherein the chemically combined chlorine content is from 15 to about 28 wt% (abstract). Attention is drawn to

Table VI, wherein the Samples 3, 4, and 5 have the chlorine content of 21.4, 23.7, and 26.2 wt% respectively and the heat of fusion of 1.13, 2.59, and 0.09 cal/g (1 J = 0.2390 cal) respectively.

The difference between the present claim and the disclosure of Jones et al. is the requirement of a step of melting and kneading polyolefin and then molding it to obtain a solid to be adapted in the process to make the chloropolyolefin in the present claims.

Yasugata discloses a process to form a film by (a) kneading and melting a mixture of polyethylene with inorganic fine powder and a specific plasticizer and (b) molding the mixture into the sheetlike shape, wherein the film read on a solid (abstract). By this process, the solid formed from the polymer would contain the required components for the desired application [*motivation*]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adapt such step because the particle properties can be tailored and thereby obtain the present invention.

8. Claims 1, 3, and 10 rejected under 35 U.S.C. 103(a) as being unpatentable over Aystetten et al. (US 3,856,766) in view of Yasugata (JP 05-009332).

Aystetten et al. disclose a process to make a light colored thermostable chloropolyolefin by chlorinating pulverulent polyethylene, polypropylene, or a copolymer of ethylene with a straight chain or branched α-olefin with gaseous chlorine, wherein the particle size of the pulverulent polymer is in the range of from about 40 to 500 micron and these polymers are produced by high pressure, medium pressure or low pressure

polymerization process (abstract; col. 1, lines 61-63). Attention is drawn to Table, wherein the amounts of chlorine are 36.7 wt% (Example 1) and 41.9 wt% (Example 2).

The difference between the present claims and the disclosure of Aystetten et al. is the requirement of a step of melting and kneading polyolefin and then molding it to obtain a solid to be adapted in the process to make the chloropolyolefin in the present claims.

Yasugata discloses a process to form a film by (a) kneading and melting a mixture of polyethylene with inorganic fine powder and a specific plasticizer and (b) molding the mixture into the sheetlike shape, wherein the film read on a solid (abstract). By this process, the solid formed from the polymer would contain the required components for the desired application [*motivation*]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adapt such step because the particle properties can be tailored and thereby obtain the present invention.

9. Claims 1, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rifi (US 4,593,075) in view of Yasugata (JP 05-009332).

Rifi discloses a process to modify ethylene polymers by reacting granular ethylene polymers having a density of about 0.87 to about 0.92 g/ccwith a gaseous chlorinating agent to produce the chlorinated polymers, wherein the particle size of the granular ethylene is exemplified to be 500 or 400 microns (abstract; col. 4, line 14 [A or B]).

The difference between the present claims and the disclosure of Rifi is the

requirement of a step of melting and kneading polyolefin and then molding it to obtain a solid to be adapted in the process to make the chloropolyolefin in the present claims.

Yasugata discloses a process to form a film by (a) kneading and melting a mixture of polyethylene with inorganic fine powder and a specific plasticizer and (b) molding the mixture into the sheetlike shape, wherein the film read on a solid (abstract). By this process, the solid formed from the polymer would contain the required components for the desired application [*motivation*]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adapt such step because the particle properties can be tailored and thereby obtain the present invention.

10. Claims 1, 3-5, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benedikt et al. (US 4,473,451) in view of Yasugata (JP 05-009332).

Benedikt et al. disclose a process for chlorination of powdered polyethylene with chlorineat an initial temperature from about 20°C to about 70°C and raising the temperature of the reaction to at least about the crystalline melting point of the polyethylene and continuing the reaction until the polyethylene contains greater than 25-45 wt% bound chlorine, wherein the polyethylene can be low density, high density, linear, or branched and has density from about 0.90 to 0.97 the average particle size; the average particle size is preferably 100 microns to less than 600 microns (abstract; col. 2, lines 30-51).

The difference between the present claims and the disclosure of Benedikt et al. is the requirement of a step of melting and kneading polyolefin and then molding it to

obtain a solid to be adapted in the process to make the chloropolyolefin in the present claims.

Yasugata discloses a process to form a film by (a) kneading and melting a mixture of polyethylene with inorganic fine powder and a specific plasticizer and (b) molding the mixture into the sheetlike shape, wherein the film read on a solid (abstract). By this process, the solid formed from the polymer would contain the required components for the desired application [*motivation*]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adapt such step because the particle properties can be tailored and thereby obtain the present invention.

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al. (US 4,767,823) in view of Yasugata (JP 05-009332).

Jones et al. disclose a chlorinated polyethylene having a weight-based median particle size of from about 120 to about 600 microns, wherein the chemically combined chlorine content is from 15 to about 28 wt% (abstract). Attention is drawn to Table VI, wherein the Samples 3, 4, and 5 have the chlorine content of 21.4, 23.7, and 26.2 wt% respectively and the heat of fusion of 1.13, 2.59, and 0.09 cal/g (1 J = 0.2390 cal) respectively. Since both chlorinated polyolefins have the substantially identical amounts of chlorine and crystal heats of fusion, the chlorinated polyolefin disclosed by Jones et al. would have the claimed elongation and T_g because heat of fusion and amount of chlorine are related to the primary structure of a polymer on which elongation and T_g depend.

The difference between the present claim and the disclosure of Jones et al. is the requirement of a step of melting and kneading polyolefin and then molding it to obtain a solid to be adapted in the process to make the chloropolyolefin in the present claims.

Yasugata discloses a process to form a film by (a) kneading and melting a mixture of polyethylene with inorganic fine powder and a specific plasticizer and (b) molding the mixture into the sheetlike shape, wherein the film read on a solid (abstract). By this process, the solid formed from the polymer would contain the required components for the desired application [*motivation*]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adapt such step because the particle properties can be tailored and thereby obtain the present invention.

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al. (US 4,767,823) in view of Yasugata (JP 05-009332).

Jones et al. disclose a process to chlorinate polyethylene having a weight-based median particle size of from about 120 to about 600 microns, wherein the chemically combined chlorine content is from 15 to about 28 wt% (abstract). Jones et al. further disclose that "[p]olyethylene resins ...are beneficially prepared under conditions characteristic of Ziegler polymerization" (col. 3, lines 19-31). It is noted that the use of Ziegler-Natta catalyst leads to a polymer having narrow molecular weight distribution - $M_w/M_n = 3 - 7$ [see Dong-ho Lee, Polymeric Materials Encyclopedia, CRC press, vol. 4,734-4740 (1996)].

The difference between the present claim and the disclosure of Jones et al. is the requirement of a step of melting and kneading polyolefin and then molding it to obtain a solid to be adapted in the process to make the chloropolyolefin in the present claims.

Yasugata discloses a process to form a film by (a) kneading and melting a mixture of polyethylene with inorganic fine powder and a specific plasticizer and (b) molding the mixture into the sheetlike shape, wherein the film read on a solid (abstract). By this process, the solid formed from the polymer would contain the required components for the desired application [*motivation*]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adapt such step because the particle properties can be tailored and thereby obtain the present invention.

13. Claim 2 is objected due to missing the first step. (US 3,856,766). Aystetten et al. disclose a process to chlorinate a polyethylene having an ultimate melting point of 136°C, comprising subjecting the polyethylene to a heat treatment by heating in a nitrogen to about 122°C and keeping at that temperature for 15 minutes; cooling down the polyethylene; and chlorinating the resulting polyethylene with chlorine at a temperature gradually raised to 137°C (Example 1). However, Aystetten et al. do not teach or fairly suggest a process comprising a step of chlorination at above the crystal melting start temperature and more than 10°C below the crystal melting peak temperature of the polyolefin **before the heat treatment**.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ling-Siu Choi whose telephone number is 571-272-1098.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reach on 571-272-1114.

LING-SUI CHOI
PRIMARY EXAMINER

January 3, 2007